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Magnetotransport Studies of CeIrIn₅ and CeCoIn₅

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Magnetotransport measurements have shed additional light on the behavior of CeRhIn₅. [1] In an effort to more fully understand the systematic relationship between CeRhIn₅ and the other members of the CeMIn₅ (M = Co, Rh, Ir) series of heavy fermion superconductors we have extended our studies to CeCoIn₅ and CeIrIn₅. To that end, we have investigated the magnetotransport in Ce-based heavy fermion superconductors CeIrIn₅ and CeCoIn₅ from 1.4 - 300 K as a function of applied magnetic fields to 18 T utilizing the 20 T superconducting magnetic located at the Los Alamos campus of the National High Magnetic Field Laboratory. Our results indicate that the magnetoresistance in both materials is smaller than antiferromagnetic CeRhIn₅. In CeIrIn₅, the sign of the magnetoresistance is dependent on the direction of applied magnetic field with the negative magnetoresistance corresponding to a single impurity-like regime extending down to lower temperature with the applied field along the c-axis than with the field applied along the basal plane. In CeCoIn₅, a similar behavior occurs in which a negative magnetoresistance is observed at higher temperatures for the field applied along the c-axis, but by 25 K the magnetoresistance is positive, independent of field direction. A negative magnetoresistance is recovered in the low temperature regime in which the superconductivity has been destroyed by an applied field.

[1] A.D. Christianson, A.H. Lacerda, M.F. Hundley, P.G. Pagliuso, and J.L. Sarrao, Phys. Rev. B **66**, 054410 (2002).

Figure 1: (a) The low temperature magnetoresistance ($\Delta\rho/\rho = (\rho(H,T) - \rho(0,T))/\rho(0,T)$)

for CeIrIn₅ with $H \parallel c$. (b) The low temperature resistivity (ρ) for CeCoIn₅ with $H \parallel c$.



